# Coiled Tubing Drilling in Alaska

The operators in Prudhoe Bay, Alaska have over a decade of experience using coiled tubing units to re-enter producing oil wells through the tubing to drill laterals up to 3,000 feet to substantially sustain production. To date, over 500 such laterals have been drilled; over 100 are slimhole out of 3 ½ inch casing or liner in which a 2 3/8-inch liner is set. There have been a number of SPE papers documenting the CT drilling activities in Alaska. Selected papers on the drilling activities are listed below. The abstract and introduction may be viewed for free on the SPE web site at http://www.spe.org/elibrary/app/search.do?mode=init or the entire paper ordered for $6.

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| Paper Number | **26086** |
| Title | **Emerging Coiled-Tubing Applications at Prudhoe Bay, Alaska** |
| Authors | Blount, C.G., Ward, S.L., ARCO Alaska Inc.; Hightower, C.M., ARCO E and P Technology; Walker, E.J., BP Exploration (Alaska) Inc. |
| Source | SPE Western Regional Meeting, 26-28 May, Anchorage, Alaska |
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Coiled Tubing was introduced to Pruhoe Bay in the early 1980s for well service and intervention. This paper documents those applications and the beginning of CT drilling in 1993.

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| Paper Number | **35128** |
| Title | **Coiled Tubing Drilling Practices at Prudhoe Bay** |
| Authors | Goodrich, G.T., Smith, B.E., ARCO Alaska, Inc.; Larson, E.B., Schlumberger Dowell |
| Source | SPE/IADC Drilling Conference, 12-15 March, New Orleans, Louisiana |
| Copyright | Copyright 1996, IADC/SPE Drilling Conference |

By 1996 the coiled tubing drilling program at Prudhoe Bay was well established. Dozens of extensions were being drilled annually at depths up to 13,000 ft. and laterally to 1,200 feet. This paper describes the best practices at that point in time and contrasts them with conventional rotary drilling.

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| Paper Number | **46016** |
| Title | **Development Update of an MWD Directional Drilling Package for 2-3/4" Openhole: Tiny Tools** |
| Authors | Blount, C.G., Gantt, L.L., Hearn, D.D., Mooney, M.B., Smith, B.E., ARCO Alaska, Inc.; Quinn, D., Schlumberger Anadrill; Larson, E.B., Schlumberger Dowell |
| Source | SPE/ICoTA Coiled Tubing Roundtable, 15-16 March, Houston, Texas |
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By the mid 1990s, using coiled tubing to drill out of 4 ½-inch production tubing was well established at Prudhoe Bay. But many of the completions were made with 3 ½-inch tubing. This paper describes the problems and solutions in the development of slim-diameter tools and bottom hole assemblies for drilling out of the smaller 3 ½-inch tubing.

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| Paper Number | **63196** |
| Title | **Concentric String Windows: Development, Testing and Field Experience** |
| Authors | C.G. Blount, L.L. Gantt, Phillips Alaska Inc.; D.D. Hearn, A.D. Kirk, B.E. Smith, BP |
| Source | SPE Annual Technical Conference and Exhibition, 1-4 October, Dallas, Texas |
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By 2000 over 220 coiled tubing sidetrack holes had been drilled. The easy ones were done and they were getting incrementally more technically difficult, particularly where there was a large difference between the tubing and casing size, e.g. 3 ½-inch tubing inside 9 5/8-inch casing. This paper describes the best practices for mitigating the risk of drilling through these difficult concentric strings.

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| Paper Number | **67824** |
| Title | **Coiled Tubing Drilling: Continued Performance Improvement in Alaska** |
| Authors | Thomas M. McCarty, Mark J. Stanley, BP Exploration (Alaska) Inc.; Lamar L. Gantt, Phillips Alaska Inc. |
| Source | SPE/IADC Drilling Conference, 27 February-1 March, Amsterdam, Netherlands |
| Copyright |  |

By 2001 over 250 sidetrack wells had been drilled in Prudhoe Bay. New technology in the form of more sophisticated and reliable bottom hole assemblies, window milling and dealing with lost circulation were responsible for more efficient operations. This paper documents those improvements.

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| Paper Number | **72058** |
| Title | **Dynamically Overbalanced Coiled-Tubing Drilling on the North Slope of Alaska** |
| Authors | D.T. Kara, D.D. Hearn, BP Exploration, Alaska; L.L. Gantt, C.G. Blount, Phillips Alaska Inc |
| Journal | SPE Drilling & Completion |
| Issue | Vol. 16, Number 2, June |
| Pages | 91-97 |
| Copyright |  |

In 2001 the coiled tubing drilling technology was sufficiently well established to expand the drilling to known over-pressured reservoir in the North Slope. The operator utilized the slimhole tools developed for Prudhoe Bay to drill a nominal 2 ¾-inch nominal open hole. This paper documents the successful three-well pilot to develop these reserves.

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| Paper Number | **74553** |
| Title | **High Performance Coil Tubing Drilling in Shallow North Slope Heavy Oil** |
| Authors | Mel Rixse, Baker Hughes INTEQ; Mark O. Johnson, BP Exploration (Alaska) |
| Source | IADC/SPE Drilling Conference, 26-28 February, Dallas, Texas |
| Copyright |  |

In 2001 the coiled tubing drilling technology was expanded to the shallow, heavy oil of the Milne Point field in the North Slope. An innovative electric line drilling bottom hole assembly and completion techniques contributed to the success of this 5 lateral (out of 3 vertical wellbores) pilot. The paper describes the new tools and techniques and the field results.

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| Paper Number | **74842** |
| Title | **A Comparison of Mud Pulse and E-Line Telemetry in Alaska CTD Operations** |
| Authors | James J. Ohlinger, Baker Hughes INTEQ; Lamar L. Gantt, Phillips Alaska Inc.; Thomas M. McCarty, BP Exploration Alaska |
| Source | SPE/ICoTA Coiled Tubing Conference and Exhibition, 9-10 April, Houston, Texas |
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Of the 250 coiled tubing drilled sidetracks in Prudhoe Bay, the standard was with a mud pulse Measurement While Drilling tool and a mechanically/hydraulically orienter. A new technology utilizing the electric wire to communicate with the bottom hole assembly was tested on 15 wells. This paper compares the two techniques by comparing drilling rate and other drilling parameters.

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| Paper Number | **92392** |
| Title | **Unique "Through Tubing" Completions Maximize Production and Flexibility** |
| Authors | Mark O. Johnson, Paul G. Hyatt, BP Exploration Inc.; Ted O. Stagg, Orbis Engineering; Lamar L. Gantt, Conoco Phillips |
| Source | SPE/IADC Drilling Conference, 23-25 February, Amsterdam, Netherlands |
| Copyright | 2005. SPE/IADC Drilling Conference |

By 2005 over 450 sidetrack holes had been drilled, including over 100 three-inch holes with 2 3/8-inch cemented or slotted liners. This paper discusses the different proven completion options: geometry, downhole equipment and operational guidelines.